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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,495	11/13/2003	Frank Jansen	M02A430	8327

7590 06/21/2005

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EXAMINER

ABRAMOWITZ, HOWARD E

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 06/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/712,495

Applicant(s)

JANSEN, FRANK

Examiner

Howard E. Abramowitz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-20 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election of Group II in the reply filed on 5/25/2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 11-17 rejected under 35 U.S.C. 102(e) as being anticipated by Sneh (US Patent Application Publication 2003/0180458).

Referring to claim 11, Sneh discloses a method of delivering precursor gasses for an ALD process comprising filling a first booster chamber with a first chemical reactant (paragraph 46) and filling a second booster chamber with a second chemical reactant (paragraph 47). To fill these chambers, chemical-dosage shut-off valves (110 and 110') between the booster chambers and the atomic layer deposition chamber must

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be closed (figure 1, table 1). The chamber is purged between adding each reactant at a pressure below that of the pressure during the dosage of the reactants (paragraph 87, table 1, table 3). To add each chemical reactant the valves (110 and 110') must be opened to allow the reactants to flow into the reaction chamber. The process runs in the general procedure of: adding the first reactant (opening its shut-off valve); purging (closing the 1st shut off valve); adding the second reactant (opening its shut off valve); purging (closing 2nd shut off valve) and repeating that sequence of steps (paragraphs 14-19, table 1). This process is run solely under a pressure gradient (paragraph 38, paragraph 89).

Referring to claims 12 and 13 Sneh discloses purging with an inert gas at a reduced pressure in between the steps of adding the reactants (paragraph 10, table 3).

Referring to claim 14, Sneh discloses that the first reactant can be trimethylaluminum (paragraph 152).

Referring to claim 15, Sneh discloses that the second reactant can be water.

Referring to claim 16, Sneh discloses that the booster chambers are connected to gas supplies (105 and 105') (figure 1, paragraph 83).

Referring to claim 17, it is inherent that the chemical-dosage shut-off valves must be closed when filling the booster chambers from the precursor gas supply to prevent unwanted transport of the precursor gas to the reaction chamber.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satta et al. (US Patent No. 6,391,785) in view of Sneh.

Referring to claims 18 and 19, Satta et al. discloses a method for forming a titanium nitride barrier layer using an ALD process. The method uses TiCl_4 as the first reactant and NH_3 as the second reactant (table 1, column 12 lines 23-28). However, Satta et al. does not disclose using a booster chamber as a method of performing the ALD reaction. The method of Sneh teaches that ALD is preferably practiced with the highest possible flow rate of purge gas and the lowest possible flow rate of reactants (paragraph 34). Sneh also proposes a method that teaches using booster chambers to help maximize the flow of the purge gas and minimize the flow of the reactant gasses, as discussed above this method meets all the requirements of claims 11 and 16. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify satta et al. to use the method suggested by Sneh with an expectation that it will achieve significant modulation of flow rates between the reactant gas and purge gas steps.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sneh as applied to claims 1-17 above, and further in view of Kang et al. (US Patent No. 6,287,965). Sneh discloses using nitrogen as a purge gas for an ALD process, but

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does not disclose using argon. However, Kang et al. teaches using either nitrogen or argon as a purge gas for an ALD reaction (column 13 lines 36-49). Accordingly it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sneh to use argon as a purge gas instead of nitrogen as Kang et al. suggests that they are both capable of performing the exact same function.

Conclusion

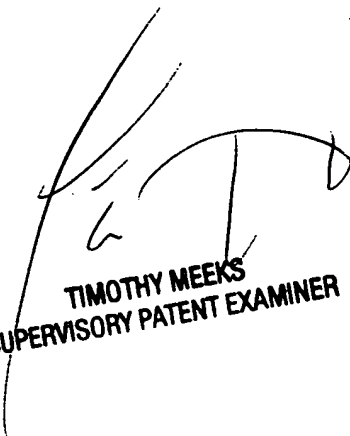
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard E. Abramowitz whose telephone number is 571-272-8557. The examiner can normally be reached on monday-friday 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on 5712721423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER